

We claim:

1. Apparatus for deploying and/or retrieving and/or repositioning a stent having a shape memory, comprising:
an elongate catheter assembly having a proximal end region and a distal end region;
a thermal transfer device situated on said catheter assembly defining a chamber having a thermal transfer wall; and

means for providing an inflow of thermal transfer fluid into said chamber from said proximal end region of said catheter assembly for transferring thermal energy to said stent through said thermal transfer wall, to adjust the temperature of the stent.
2. Apparatus as recited in claim 1 wherein said thermal transfer device comprises an expandable member structured and arranged to expand and collapse between an expanded condition and a collapsed condition.
3. Apparatus as recited in claim 2 wherein said thermal transfer device includes an adjustable wire frame for expanding and collapsing said expandable member.
4. Apparatus as recited in claim 3 wherein said catheter assembly comprises an inner core catheter and a relatively movable outer core catheter situated over said inner core

catheter, said outer core catheter having a distal end which is situated proximally of the distal end of said inner core catheter so that a projecting portion of said inner core catheter extends beyond said distal end of said outer core catheter and wherein said wire frame comprises a plurality of wires, each wire having one end fixed to a distal end of said projecting portion of said inner core catheter, another end fixed to the distal end of said outer core catheter, and a central region attached to said expandable members; whereby relative movement of said inner and outer core catheters to shorten the projecting portion of said inner core bends said wires and expands said expandable member to its expanded condition while relative movement of said inner and outer core catheters to lengthen the projecting portion of said inner core straightens said wires and collapses said thermal transfer device to its collapsed condition.

5. Apparatus as recited in claim 4 wherein said expandable member comprises an inflatable balloon.
6. Apparatus as recited in claim 5 wherein said thermal transfer material forming said chamber comprises flexible sheet material.
7. Apparatus as recited in claim 6 wherein said thermal transfer material comprises a polymer material.
8. Apparatus as recited in claim 2 wherein said expandable member includes a balloon formed at least in part of said thermal transfer wall of said chamber.

9. Apparatus as recited in claim 8 wherein said means for providing inflow of thermal transfer fluid into said chamber comprises means for inflating said balloon member.
10. Apparatus as recited in claim 8 wherein said catheter assembly includes means for expanding and collapsing said balloon.
11. Apparatus as recited in claim 1 wherein said means for providing an inflow of thermal transfer fluid into said chamber comprise passages formed at least in part in said elongate catheter assembly.
12. Apparatus as recited in claim 11 wherein said passages open from said catheter assembly into the interior of said chamber of said thermal transfer device.
13. Apparatus as recited in claim 12 wherein said elongate catheter assembly comprises an inner core catheter and a relatively movable outer core catheter situated over said inner core catheter, and wherein said opening of said passage comprises an axially facing annular opening defined between a distal end of said outer core catheter and said inner core catheter.
14. Apparatus as recited in claim 12 wherein said catheter assembly comprises an

inner core catheter, and wherein said opening of said passage comprises a radially facing opening constituting a port formed in a side wall of said inner core catheter.

15. Apparatus as recited in claim 11 wherein said passage opens at said catheter assembly at a port situated at the exterior of said chamber, and wherein said inflow providing means further comprises separate conduit means fluidly communicating said port and said chamber interior.

16. Apparatus for deploying, retrieving and/or repositioning a stent having a shape memory, comprising:

an elongate catheter assembly having proximal and distal end regions;

a thermal transfer device including a balloon member operatively connected to said catheter assembly defining a chamber having a thermal transfer wall, at least a part of which constitutes a thermal transfer material; and

circulation means for providing an inflow of thermal transfer fluid into the interior of said chamber for transferring thermal energy to a stent through said outer thermal transfer wall to adjust the temperature of the stent, and for providing an outflow of thermal transfer fluid from the interior of said chamber to said proximal end region of said catheter assembly.

17. Apparatus as recited in claim 16 wherein said balloon member comprises a

sleeve-type balloon expandable to an expanded condition and collapsible to a collapsed position, said balloon member comprising a chamber which in its expanded condition has an annular cross-section and defines an axially extending through-passage.

18. Apparatus as recited in claim 17 wherein said catheter assembly comprises at least one core catheter; and wherein

said circulation means includes an inflow lumen formed in said core catheter, an inflow tube fluidly interconnecting the distal end of the inflow lumen and the interior of said chamber, an outflow lumen formed in said core catheter between said proximal and distal end regions; and an outflow tube fluidly interconnecting the distal end of said outflow lumen and said interior of said chamber.

19. Apparatus as recited in claim 17 wherein said thermal transfer device further comprises an adjustable wire frame operatively associated with said catheter assembly for expanding and collapsing said balloon member.

20. Apparatus as recited in claim 19 wherein said catheter assembly comprises an inner core catheter and an outer core catheter situated over said inner core catheter, said outer core catheter having a distal end which is situated proximally of the distal end of said inner core catheter so that a projecting portion of said inner core catheter extends beyond said distal end of said outer core catheter; and wherein

said wire frame comprises a plurality of wires, each wire having one end fixed to

a distal end of said projecting portion of said inner core catheter, another end fixed to the distal end of said outer core catheter and a central region attached to said balloon member, whereby relative movement of said inner and outer core catheters to shorten the projecting portion of said inner core bends said wires and expands said balloon member while relative movement of said inner and outer core catheters to lengthen the projecting portion of said inner core catheter straightens said wires and collapses said balloon member.

21. Apparatus as recited in claim 16 wherein said catheter assembly comprises at least one core catheter, and wherein said balloon member has a distal end sealed in fluid sealing relationship around the circumference of said core catheter and a proximal end also sealed in fluid sealing relationship around the circumference of said core catheter.

22. Apparatus as recited in claim 21 wherein said circulation means comprise at least one pair of inflow and outflow lumens formed in said core catheter substantially between said proximal and distal end regions of said catheter assembly; said lumens having distal ends opening at ports into the interior of said chamber.

23. Apparatus as recited in claim 22 wherein said balloon member comprises a solid-type balloon expandable to an expanded condition and collapsible to a collapsed condition, said balloon member comprising a chamber which in its expanded condition has a disk-like cross section.

24. Apparatus as recited in claim 23 wherein said catheter assembly further includes an outer core catheter situated over said inner core catheter so as to be relatively movable with respect thereto, said outer core catheter having a distal end which is situated proximally of the distal end of said inner core catheter, so that a projecting portion of said inner core catheter extends beyond said distal end of said outer core catheter.

25. Apparatus as recited in claim 24 wherein thermal transfer device includes an adjustable wire frame for expanding and collapsing said balloon member.

26. Apparatus as recited in claim 25 wherein said adjustable wire frame comprises a plurality of wires, each wire having one end fixed to a distal end of said projecting portion of said inner core catheter, another end fixed to the distal end of said outer core catheter and a central region attached to said balloon member, whereby relative movement of said inner and outer core catheters to shorten the projecting portion of said inner core bends said wires and expands said balloon member while relative movement of said inner and outer core catheters to lengthen the projecting portion of said inner core catheter straightens said wires and collapses said balloon member.

27. Apparatus as recited in claim 22 wherein said balloon member comprises a balloon having at least one longitudinal fold attached to the inner core catheter along its axis and expandable to an expanded condition, and collapsible to a collapsed condition, said balloon member comprising a chamber which in its expanded condition, has at least one radial groove in cross-section.

28. Apparatus as recited in claim 27 wherein said catheter assembly further includes an outer core catheter situated over said inner core catheter so as to be relatively movable with respect thereto, said outer core catheter having a distal end which is situated proximally of the distal end of said inner core catheter, so that a projecting portion of said inner core catheter extends beyond said distal end of said outer core catheter.

29. Apparatus as recited in claim 28 wherein said thermal transfer device includes an adjustable wire frame for expanding and contracting said balloon member.

30. Apparatus as recited in claim 29 wherein said adjustable wire frame comprises a plurality of wires, each wire having one end fixed to a distal end of said projecting portion of said inner core catheter, another end fixed to the distal end of said outer core catheter and a central region attached to said balloon member, whereby relative movement of said inner and outer core catheters to shorten the projecting portion of said inner core bends said wires and expands said balloon member while relative movement of said inner and outer core catheters to lengthen the projecting portion of said inner core catheter straightens said wires and collapses said balloon member.

31. Apparatus as recited in claim 16 wherein said catheter assembly comprises an inner core catheter and an outer core catheter situated over said inner core catheter and relatively movable with respect thereto, said outer core catheter having a distal end which is situated proximally of the distal end of said inner core catheter, so that a projecting

portion of said inner core catheter extends beyond said distal end of said outer core catheter; and wherein

said balloon member has a distal end sealed in fluid sealed relationship around the circumference of a distal end region of said inner core catheter, and said balloon member has a proximal end sealed in fluid sealed relationship around the circumference of a distal end region of said outer core catheter.

32. Apparatus as recited in claim 31 wherein said circulation means include at least one of an inflow and outflow passage comprising passage means formed in said catheter assembly extending from the proximal end region thereof and opening at said distal end region thereof at an axially facing annular opening defined between the inner core catheter and the distal end of said outer core catheter.

33. Apparatus as recited in claim 31 wherein said balloon member is expandable to an expanded condition and collapsible to a collapsed condition, said balloon member comprising a chamber which in its expanded condition has a disk-like cross-section.

34. Apparatus as recited in claim 33 wherein said thermal transfer device includes an adjustable wire frame for expanding and collapsing said balloon member.

35. Apparatus as recited in claim 34 wherein said wire frame assembly comprises a

plurality of wires, each wire having one end fixed to a distal end of said projecting portion of said inner core catheter, another end fixed to the distal end of said outer core catheter and a central region attached to said balloon member, whereby relative movement of said inner and outer core catheters to shorten the projecting portion of said inner core bends said wires and expand said balloon while relative movement of said inner and outer core catheters to lengthen the projecting portion of said inner core catheter straightens said wire and collapses said balloon member.

36. Apparatus as recited in claim 31 wherein said balloon member comprises a balloon having at least one longitudinal fold attached to the inner core catheter along its axis and expandable to an expanded condition, and collapsible to a collapsed condition, said balloon member comprising a chamber which in its expanded condition, has at least one groove in cross section defining space between them.

37. Apparatus as recited in claim 36 wherein said thermal transfer device includes an adjustable wire frame for expanding and collapsing said balloon member.

38. Apparatus as recited in claim 37 wherein said wire frame assembly comprises a plurality of wires, each wire having one end fixed to a distal end of said projecting portion of said inner core catheter, another end fixed to the distal end of said outer core catheter and a central region attached to said balloon member, whereby relative movement of said inner and outer core catheters to shorten the projecting portion of said inner core bends said wires and expands said balloon member while relative movement

of said inner and outer core catheters to lengthen the projecting portion of said inner core catheter straightens said wires and collapses said balloon member.

39. Apparatus as recited in claim 16 wherein said chamber of said balloon member comprises an outer chamber portion at least partially defined by said outer wall and an inner chamber portion in fluid communication with said outer chamber portion, and wherein

said circulation means comprise means for providing an inflow of thermal transfer

fluid from the proximal end region of said catheter assembly into the interior of said outer chamber portion and means for providing an outflow of thermal transfer fluid from said inner chamber portion to the proximal end region of the catheter assembly;

40. Apparatus as recited in claim 16 wherein said catheter assembly includes an inner core catheter and a relatively movable outer core catheter situated over the inner core catheter, said outer core catheter comprising a concentric fluid passage divided into at least two sub-passages; and wherein

said circulation means comprise means for providing one of an inflow and outflow of thermal transfer fluid from the proximal end region of said catheter assembly into the interior of said chamber through the concentric walled fluid passage of said outer core catheter; and

the other of said inflow and outflow of heat transfer fluid from the proximal end region of said catheter assembly into the interior of said chamber through an annular catheter space defined between the other of said sub-passages.

41. Apparatus for deploying, retrieving and/or repositioning a stent having a shape memory, comprising:

an elongate catheter assembly having proximal and distal end regions;

a thermal transfer device comprising an expandable member situated on said catheter assembly defining a chamber having a thermal transfer wall, at least a portion of which constitutes a heat transfer material, said expandable member being expandable and collapsible between expanded and collapsed conditions;

circulation means for providing an inflow of thermal transfer fluid from the proximal end region of said catheter assembly into the interior of said chamber and for providing an outflow of thermal transfer fluid from the interior of said chamber to the proximal end region of said catheter assembly; and

a stent-capturing device situated on said catheter assembly for releasably holding a stent situated at said expandable member during deployment, and releasably grasping said stent during its retrieving and/or repositioning.

42. Apparatus as recited in claim 41 wherein said stent capturing device comprise hook members situated in the region of said expandable member and structured and arranged to hold the stent during delivery, and/or grab the stent during retrieval and/or repositioning.

43. Apparatus as recited in claim 42 wherein said hook members are structured and arranged to capture the stent in a collapsed condition and to continue to capture the stent as it expands radially from said collapsed condition during deployment.

44. Apparatus as recited in claim 41 wherein said catheter assembly comprises at least one core catheter and wherein said stent-capturing device includes a plurality of stent-capturing members and a stent-capturing sheath positioned over said core catheter and moveable with respect thereto, said stent-capturing members being connected to a distal end of said stent-capturing sheath.

45. Apparatus as recited in claim 44 wherein said catheter assembly further comprises a stent-receiving sheath positioned over said stent-capturing sheath to be moveable with respect thereto, said stent-receiving sheath structured and arranged to engage said stent-capturing members upon movement of said stent-capturing and stent-receiving sheaths with respect to each other to thereby cause or permit said stent-capturing members to move in a radial direction.

46. Apparatus as recited in claim 41 wherein said expandable member of said thermal transfer device comprises a balloon member, and wherein said catheter assembly includes a core catheter over a distal end region of which said balloon member is situated; and

said balloon member in its expanded condition includes at least one pair of radially and axially extending opposed wall members extending longitudinally between said outer wall of said balloon member and said core catheter, said opposed wall members at least in part forming said chamber and defining a radial space external of said chamber therebetween;

said stent-capturing means including at least one hook member, situated in said radial space, one end of said at least one hook member being coupled to said core catheter.

47. Apparatus as recited in claim 46 wherein said balloon member further includes means situated in said radial space for engaging said at least one hook member upon expansion of said balloon member to its expanded condition to move the hook member and for engaging said at least one hook member upon collapse of said balloon member to its collapsed condition to move the hook member.

48. Apparatus as recited in claim 41 wherein said expandable member of said thermal transfer device comprises a balloon member; and wherein said stent capturing device comprises at least one wire finger, each wire finger having a first end secured to said catheter assembly and a body portion slidably secured to said balloon member to open upon expansion of said balloon member and close upon collapse of said balloon member.

49. Apparatus as recited in claim 48 further comprising an adjustable wire frame operatively associated with said catheter assembly for expanding and collapsing said balloon member, said wire frame including at least one pair of wires coupled to said balloon having a bridging member; and wherein said body portion of said wire finger engages said bridging member to slidably secure said wire finger to said balloon member.

50. Apparatus as recited in claim 48 further comprising an adjustable wire frame operatively associated with said catheter assembly for expanding and collapsing said balloon member, said wire frame including at least one wire coupled to said balloon; a guide affixed to said wire; and wherein said body portion of said wire finger passes through said guide to slidably secure said wire finger to said balloon member.

51. Apparatus for deploying, repositioning and/or retrieving a stent, comprising:

an elongate catheter assembly having a proximal end region and a distal end region;

a thermal transfer device comprising a collapsible sleeve-type balloon member comprising a chamber which in its expanded condition has an annular cross-section, said balloon being situated at said distal end of said catheter assembly, said balloon member having an outer wall formed at least in part of heat transfer material;

mechanical means for selectively expanding and collapsing said balloon member operable from said proximal end region of said catheter assembly;

thermal transfer fluid circulating means for circulating a thermal transfer fluid from the proximal end of said catheter assembly into said chamber of said balloon member and back to said proximal end region of said catheter assembly; and

stent-capturing means situated at said distal end region of said catheter assembly for releasably holding said stent during deployment, and grasping said stent during retrieval and/or repositioning.

52. Apparatus as recited in claim 51 wherein said catheter assembly comprises an inner core catheter and a relatively movable outer core catheter situated over said inner core catheter, said outer core catheter having a distal end which is situated proximally of the distal end of said inner core catheter, so that a projecting portion of said inner core catheter extends beyond said distal end of said outer core catheter; and

wherein said mechanical means for expanding and collapsing said balloon member comprises a frame assembly comprising a plurality of wires, each wire having one end fixed to a distal end of said projecting portion of said inner core catheter, another end fixed to the distal end of said outer core catheter and a central region attached to said balloon member, whereby relative movement of said inner and outer core catheters to shorten the projecting portion of said inner core bends said wires and expands said balloon member while relative movement of said inner and outer core catheters to lengthen the projecting portion of said inner core catheter straightens said wires and collapses said balloon member.

53. Apparatus as recited in claim 51 wherein said stent-capturing means comprise a relatively movable stent-capturing sheath situated over said outer core catheter and a relatively moveable stent-receiving sheath situated over said stent capturing sheath; and

hook members affixed to a distal end of said stent-capturing sheath which engage said stent-receiving sheath to move in a radial direction in response to relative movement between said stent-capturing sheath and said stent-receiving sheath.

54. Apparatus for deploying, repositioning and/or retrieving a stent, comprising:

a catheter assembly having a proximal end region and a distal end region;

a thermal transfer device comprising an expandable member comprising a chamber which in its expanded condition has a circular disk shape transverse cross-section, said expandable member having an outer wall formed at least in part of heat transfer material;

mechanical means for selectively expanding and collapsing said expandable member operable from said proximal end region of said catheter assembly;

thermal fluid circulating means for circulating a thermal transfer fluid from the proximal end region of said catheter assembly into said chamber of said expandable member and back to said proximal end region of said catheter assembly; and

stent-capturing means situated at said distal end region of said catheter assembly for releasably capturing said stent during deployment, retrieval and/or repositioning.

55. Apparatus as recited in claim 54, comprising:

an inner core catheter and a relatively movable outer core catheter situated over said inner core catheter, said outer core catheter having a distal end which is situated proximally of the distal end of said inner core catheter, so that a projecting portion of said inner core catheter extends beyond said distal end of said outer core catheter; and

wherein said mechanical means for expanding and collapsing said expandable

member comprises a frame assembly comprising a plurality of wires, each wire having one end fixed to a distal end of said projecting portion of said inner core catheter, another end fixed to the distal end of said outer core catheter and a central region attached to said expandable member, whereby relative movement of said inner and outer core catheters to shorten the projecting portion of said inner core bends said wires and expands said expandable member while relative movement of said inner and outer core catheters to lengthen the projecting portion of said inner core catheter straightens said wires and collapses said balloon member.

56. Apparatus as recited in claim 54 wherein said stent-capturing means comprise a stent-capturing sheath situated over said outer core catheter and a stent-receiving sheath situated over said stent-capturing sheath; and

stent-capturing hooks affixed to a distal end of said stent-capturing sheath which engage said stent-receiving sheath to move in a radial direction in response to relative movement between said stent-capturing sheath and said stent-receiving sheath.

57. Apparatus for deploying, retrieving and/or repositioning a stent, comprising:

a catheter assembly having proximal and distal end regions;

a thermal transfer device comprising a collapsible balloon member comprising a chamber which in its expanded condition includes at least one pair of radially and axially

extending opposed wall members extending longitudinally between said outer wall of said balloon member and said catheter assembly, said pair of opposed wall members at least in part forming said chamber and defining a radial space external of said chamber therebetween;

mechanical means for selectively expanding and collapsing said balloon member operable from said proximal end region of said catheter assembly;

thermal transfer fluid circulating means for circulating a thermal fluid from said proximal end of said catheter assembly into said chamber of said balloon member and back to said proximal end region of said catheter assembly; and

stent-capturing means situated at said catheter assembly for releasably capturing said stent during deployment, retrieval and/or repositioning.

58. Apparatus as recited in claim 57 wherein said catheter assembly comprises an inner core catheter and a relatively movable outer core catheter situated over said inner core catheter, said outer core catheter having a distal end which is situated proximally of the distal end of said inner core catheter, so that a projecting portion of said inner core catheter extends beyond said distal end of said outer core catheter; and

wherein said mechanical means for expanding and collapsing said balloon comprises a frame assembly including a plurality of wires, each wire having one end

fixed to a distal end of said projecting portion of said inner core catheter, another end fixed to the distal end of said outer core catheter and a central region attached to said balloon member, whereby relative movement of said inner and outer core catheters to shorten the projecting portion of said inner core bends said wires and expands said balloon member while relative movement of said inner and outer core catheter to lengthen the projecting portion of said inner core catheter straightens said wires and collapses said balloon member.

59, Apparatus as recited in claim 57 wherein said stent-capturing means comprise at least one hook member situated in said radial space defined by said opposed radial wall members of said balloon member.

60. Apparatus as recited in claim 57 wherein said catheter assembly comprises at least one core catheter; and wherein said circulating means comprise lumens extending between said proximal and distal end regions of said core catheter and opening into the interior of said chamber of said balloon member.

61. Apparatus as recited in claim 57 wherein said catheter assembly comprises an inner core catheter and a relatively moveable outer core catheter situated over said inner core catheter, said outer core catheter having a distal end which is situated proximally of the distal end of said inner core catheter, so that a projecting portion of said inner core catheter extends beyond said distal end of said outer core catheter; and

wherein said balloon has a distal end sealingly fixed to said projecting portion of said inner core catheter and a proximal end in sealingly engagement with the distal end of said outer core catheter; and

wherein said circulating means comprises a lumen formed between the inner and outer core catheters.

62. Apparatus for deploying, retrieving and/or repositioning a stent, comprising:
an elongate catheter assembly having proximal and distal end regions;

a thermal transfer device operatively connected to said catheter assembly, said thermal transfer device comprising a collapsible balloon comprising a chamber which in its expanded condition comprises an outer chamber portion having an outer wall formed at least in part of heat transfer material, and an inner chamber portion in fluid communication with said outer chamber portion;

mechanical means for selectively expanding and collapsing said balloon operable from said proximal end region of said catheter assembly;

thermal fluid circulating means for circulating a thermal fluid from the proximal end of said catheter assembly into said outer chamber portion of said balloon and back to said proximal end region of said catheter assembly from said inner chamber portion of said balloon; and

stent-capturing means situated at said distal end region of said catheter assembly for releasably capturing said stent during deployment, retrieval and/or repositioning.

63. Apparatus as recited in claim 62 wherein said catheter assembly comprises an inner core catheter and a relatively movable outer core catheter situated over said inner core catheter, said outer core catheter having a distal end which is situated proximally of the distal end of said inner core catheter, so that a projecting portion of said inner core catheter extends beyond said distal end of said outer core catheter; and

wherein said mechanical means for expanding and collapsing said balloon member comprises a frame assembly comprising a plurality of wires, each wire having one end fixed to the distal end of said projecting portion of said inner core catheter, another end fixed to the distal end of said outer core catheter and a mid-region attached to
said balloon member,

whereby relative movement of said inner and outer core catheters to shorten the projecting portion of said inner core bends said wires and expands said balloon member while relative movement of said inner and outer core catheter to lengthen the projecting portion of said inner core catheter straightens said wires and collapses said balloon member.

64. Apparatus as recited in claim 62 wherein said stent-capturing means comprise a relatively movable stent-capturing sheath situated over said outer core catheter and a relatively moveable stent-receiving sheath situated over said stent-capturing sheath; and

hook members affixed to a distal end of said stent-capturing sheath which engage said stent receiving sheath to move in a radial direction in response to relative movement between said stent-capturing sheath and said stent-receiving sheath.

65. Apparatus as recited in claim 62 wherein said catheter assembly comprises an inner core catheter and a relatively moveable outer core catheter situated over said inner core catheter, said outer core catheter having a distal end which is situated proximally of the distal end of said inner core catheter, so that a projecting portion of said inner core catheter extends beyond said distal end of said outer core catheter; and where said balloon has a distal end sealingly fixed to said projecting portion of said inner core catheter and a proximal end in sealing engagement with the distal end of said outer core catheter, and wherein said circulating means comprise a lumen formed between the inner and outer core catheter.

66. Apparatus for deploying and/or retrieving and/or repositioning a stent having a shape memory, comprising

an elongate catheter assembly having a proximal end region and a distal end region; and

a thermal transfer device operatively associated with said catheter assembly, said thermal transfer device comprising means for effecting local heat transfer with a stent being deployed, retrieved and/or repositioned by said apparatus to control the temperature of the stent.

67. Apparatus as recited in claim 66 further including a stent-capturing device operatively associated with said catheter assembly, said stent-capturing device comprising means for releasably holding a stent during its deployment and/or grabbing during repositioning and/or retrieving.

68. Apparatus as recited in claim 66 wherein said thermal transfer device includes a thermal transfer surface, and means for positioning said thermal transfer surface in local thermal transfer relationship with a stent during its deployment, retrieval and/or repositioning.

69. Apparatus as recited in claim 68 wherein said thermal transfer device includes a chamber defined at least in part by a thermal transfer wall having said thermal transfer surface.

70. Apparatus as recited in claim 66 wherein said thermal transfer device includes an adjustable member structured and arranged to expand and collapse between an expanded condition and a collapsed condition.

71. Apparatus as recited in claim 69 wherein said thermal transfer device further includes means for circulating a thermal transfer fluid through said chamber for transferring thermal energy between said fluid and the stent through said thermal transfer wall when said thermal transfer wall is in local thermal transfer relationship with the stent, and means for adjusting the temperature of the thermal transfer fluid.

72. Apparatus as recited in claim 71 wherein said means for adjusting the temperature of the thermal transfer fluid are situated at the proximal end of the catheter assembly.

73. Apparatus as recited in claim 71 wherein said means for adjusting the temperature of the thermal transfer fluid comprises at least one optic fiber, extending from the proximal end of said catheter assembly and terminating in said chamber of said thermal transfer device, for transmitting a laser beam into said chamber to adjust the temperature of the thermal transfer fluid.

74. Apparatus as recited in claim 71 wherein said means for adjusting the temperature of the thermal transfer fluid comprises an ultrasound probe situated in said chamber for communication with an ultrasonic generator for transmitting ultrasonic waves into the thermal transfer fluid to adjust the temperature of the thermal transfer fluid.

75. Apparatus as recited in claim 71 wherein said means for adjusting the temperature of the thermal transfer fluid comprises an electrical conductor situated in said chamber

for coupling to means for generating a current in said conductor to adjust the temperature of the thermal transfer fluid.

76. Apparatus as recited in claim 75 wherein said electrical conductor is coiled, and wherein said current generating means comprise means for applying a magnetic field from an external source to said electrical conductor.

77. Apparatus as recited in claim 68 wherein said thermal transfer device further includes means for adjusting the temperature of the thermal transfer surface.

78. Apparatus as recited in claim 77 wherein said means for adjusting the temperature of the thermal transfer surface comprises at least one electrical conductor coupled to said thermal transfer surface for connection to current generating means.

79. Apparatus as recited in claim 78 wherein said electrical conductor is formed in a spiral-shape on said thermal transfer surface, and wherein said current generating means comprise means for applying a magnetic field to said electrical conductor.

80. Apparatus as recited in claim 77 wherein said means for adjusting the temperature of the thermal transfer device comprises at least one optic fiber, extending from the proximal end of said catheter assembly and terminating on said thermal transfer surface, for transmitting a laser beam along and around said thermal transfer surface.

81. Apparatus as recited in claim 66 wherein said thermal transfer device comprises at least one conductive wire surface situated on said thermal transfer surface.

82. Apparatus as recited in claim 30 further including a stent-capturing device situated in said at least one longitudinal fold for releasably holding a stent situated on said expandable member during deployment, and releasably grasping said stent during its retrieving and/or repositioning.

83. Apparatus as recited in claim 36 further including a stent-capturing device situated in said at least one longitudinal fold for releasably holding a stent situated on said expandable member during deployment, and releasably grasping said stent during its retrieving and/or repositioning.

84. Apparatus as recited in claim 47, wherein said engaging means comprise bridging means extending across said radial space between said opposed pair of radially extending walls.

85. Apparatus as recited in claim 57 wherein said balloon member further includes means situated within said radial space for engaging said stent-capturing means upon expansion of said balloon member to its expanded condition and to move said capturing means upon collapse of said balloon member to its collapsed condition.

86. Apparatus as recited in claim 70 wherein said adjustable member comprises an adjustable wire frame including a plurality of wires formed from electrically conductive material, and further including means for passing an electrical current through said wires to heat the same.